Mecro-Economic Voting: Local Information and Micro-Perceptions of the Macro-Economy*

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December 6, 2013

Abstract

We develop an incomplete-information theory of economic voting, where voters' information about macro-economic performance is determined by the economic conditions of people similar to themselves. We test our theory using both cross-sectional and time-series survey data. A novel survey instrument that asks respondents their numerical assessment of the unemployment rate confirms that individuals' economic information responds to the economic conditions of people similar to themselves. Further, these assessments are correlated with individuals' vote choices. We also show in time-series data that state unemployment robustly correlates with evaluations of national economic conditions, and presidential support.

*We are indebted to Jim Alt and Rod Kiewiet for continual encouragement. We also thank Mike Alvarez, Laurent Bouton, John Bullock, Conor Dowling, Ray Duch, Jon Eguia, Jeff Frieden, Julia Gray, Lisa Martin, Nolan McCarty, Stephanie Rickard, Ken Scheve, Barry Weingast, and Chris Wlezien for comments and suggestions, and seminar audiences at Harvard, LSE, MIT, NYU, Temple, Yale, the 2009 Midwest Political Science Association and the 2010 American Political Science Association Conferences for useful feedback and comments.

One of the most robust relationships in political economy is economic voting: the positive correlation between an area's economic performance and the performance of incumbent politicians and parties.[1] However, no consensus exists about the micro foundations underlying this relationship. Survey data show that vote choice is more strongly correlated with voter assessments of national economic conditions than with assessments of personal economic conditions. This pattern is called sociotropic voting (Kinder and Kiewiet, 1981; Kiewiet, 1983; Lewis-Beck, 1988), and is often interpreted as evidence that voters have other-regarding preferences (see, for example, Lewin, 1991; Kiewiet and Lewis-Beck, 2011). This conclusion contrasts sharply with almost all political economy models, which assume that voters are purely self-interested, and care only about their own economic well-being (Meltzer and Richard, 1981; Persson and Tabellini, 2000).

This paper eases this tension between the political behavior and political economy literatures by examining two distinct, but related, questions. First, how do economic voters form perceptions of aggregate economic performance? Our theory of *mecro-economic voting* posits that voters use the noisy signals about aggregate economic performance they get in their daily life to make inferences about the state of the aggregate economy. We then explore how the resulting heterogeneity in perceptions of aggregate economic performance affects our ability to infer voter preferences from observed patterns of economic voting. Because personal economic experience affects perceptions of the aggregate economy, we contend that it is difficult to learn about the motivations of economic voters without explicitly modeling how voters acquire and use information about aggregate economic conditions.

Our theory begins with the assumption that voters do not gather additional economic information to inform vote choice (Downs, 1957; Popkin, 1991). Instead vote choices are based on the information collected for personal economic planning, often from social networks and the media. Each voter is a member of several groups, defined by location, industry, race, age, gender, and so on. Following some economists, we refer to these groups as individuals'

[1]The literature on economic voting is truly massive. For recent reviews of the literature see Lewis-Beck and Paldam (2000) and Hibbs (2006).

mecro-economies, so called because they are somewhere between the *macro*- and *micro*-economy.[2] Because members of these groups are similarly affected by economic shocks, such as the policies of the incumbent government, we expect that voters' perceptions of aggregate economic performance strongly relate to the economic circumstances in their mecro-economy.

It is then straight-forward to argue that mecro-economic conditions will relate to the vote choices of both self-interested and other-regarding voters, and, as such, we can learn very little about the motivations of economic voters without taking information explicitly into account. A voter's economic well-being is an extremely noisy measure of the incumbent government's policies. Thus, additional information about the economic fortunes of others in a voter's mecro-economy improves voters' assessments about which candidate or party is better for their own economic well-being (Kinder and Kiewiet, 1981). Thus, self-interested voters will vote on the basis of this information. As information about the economic fortunes of others also affect perceptions of aggregate economic conditions, other-regarding voters will use the same information. Consequentially, both self-interested and other-regarding voters will appear to vote the same way, on the basis of the same information.

We test the mecro-economic voting model in two types of data. First, we examine individuals' assessments of the aggregate economy, and show that these reflect mecro-economic patterns. Further, vote choice associates with these assessments. Second, we show that these results are robust in aggregate, time-series data.

Testing the prediction that perceptions of the aggregate economy reflect mecro-economic conditions is difficult as most survey questions, like the retrospective economic evaluation, confound individuals' information about economic performance with their judgement about how good or bad that performance is (Ansolabehere, Meredith and Snowberg, 2013). Thus, we develop a novel survey instrument on the 2008 Cooperative Congressional Election Survey (CCES) that asks respondents to report both their perception of the national unemployment

[2]Kiewiet and Lewis-Beck (2011, p. 314) explain the term mecro-economy as, "[S]patially, phenomenologically, and linguistically located between the micro-economy of the individual and macro-economy of the country as a whole."

rate and gas prices.[3]

In accordance with theory, we find that individuals from groups that experience more unemployment report higher national unemployment rates. Specifically, ethnic minorities, those with lower educational attainment, and individuals from states with higher unemployment rates all report higher rates of *national* unemployment. These reported unemployment rates correlate with vote choice, even when controlling for numerous other factors.

Additionally, our theory predicts that perceptions of aggregate economic conditions are more homogeneous among individuals that receive more information about the aggregate economy. As the national unemployment rate is often reported in national news, we predict that people who watch national news report more homogenous assessmenta of aggregate economic conditions than those who do not. In contrast, as gas prices are directly observable, we predict that perceptions of gas prices are similar among those who do and do not watch national news. These predictions are empirically supported.

Our second set of empirical results implement similar tests in panel data in order to address concerns that the results from the CCES are due simply to omitted variables. In particular, controlling for unobserved, persistent heterogeneity, and national trends, we show that state economic conditions affect responses to both the national and personal retrospective economic evaluations on the Michigan Consumer Survey. We then use a monthly time-series of state-level presidential approval from Gallup from 1977 to 2012, which was partially constructed for this study, and show that presidential approval is also lower in states where the economy is performing relatively worse.

Before turning to an overview of relevant literature, it is important to note that many of elements of our theory are not new. Downs (1957) and Popkin (1991) develop the idea that voters are imperfectly informed and vote based on information gathered for other purposes. Kinder and Kiewiet (1981) suggest that national economic conditions may be a better sig-

[3]This follows Alvarez and Brehm (2002) in focusing on hard information when assessing the information sets of respondents, which may better isolate variation in reported economic evaluations that are rooted in differences in actual economic information (Ansolabehere, Meredith and Snowberg, 2012).

nal of the incumbent's effects on an individual's future economic well-being than personal economic circumstances. Kiewiet (1983) emphasizes that much economic information likely comes from a voter's friends and neighbors. Weatherford (1983*b*) notes that local economic conditions may affect perceptions of national economic conditions. What is novel here is the attempt to synthesize these elements into a coherent theory, draw new testable implications, and examine these implications both in new data, and new analyses of old data. While the evidence we offer here is not exhaustive, it is suggestive of a new approach for studying economic voting.

1.1 Relation to the Literature

The literature on economic voting is vast, and, as our theory synthesizes several extant concepts, it has ties to many of the sub-literatures. Here we do our best to make those ties explicit. This paper contributes to the general literature on economic voting by providing a theory of how voters acquire economic information, and use this information in vote choice. It contributes to the literature on heterogeneity in voters' economic evaluations by drawing attention to the distinction between economic information and the judgment of that information in forming economic evaluations, and documenting new empirical facts about voters' economic information. Finally, it builds on work that investigates how local economic conditions relate to voters' economic assessments and political preferences.

Economic Voting. Since Kramer's (1983) influential critique, research on economic voting has largely been split between work that considers variations in aggregate, time-series data, and that which considers individual, cross-sectional data. Most aggregate studies relate time-series variation in aggregate economic measures to time-series variation in political support. These economic measures can either be objective measures of economic performance like economic growth or the unemployment rate (for example, Kramer, 1971), or aggregated subjective economic evaluations (for example, MacKuen, Erikson and Stimson, 1992;

Erikson, MacKuen and Stimson, 2002). This contrasts with individual-level studies that relate cross-sectional variation in economic evaluations with political preferences (Lewis-Beck, 1988; Duch and Stevenson, 2008).

Kramer (1983) asserts that much of the cross-sectional variation in economic evaluations is driven by extraneous factors.[4] However, as our theory suggests that some cross-sectional variation is driven by actual differences in economic information, ignoring it is costly. For example, in our theory, informational differences may lead one voter to support the incumbent because he or she perceives the economy is performing well, while another voter, in the same election, supports the challenger because he or she perceives the economy is performing poorly.[5] Both votes are identified as economically motivated in cross-sectional data, but cancel each other out in aggregate data.

Heterogeneity in Economic Evaluations. Theories of economic voting require that individuals form perceptions of the economy, and then judge those perceptions, in the process of forming economic evaluations. The retrospective economic evaluation, the modal source of cross-sectional data, confounds perceptions and judgments. That is, heterogeneity in retrospective economic evaluations may result either because voters have different information about economic conditions, or because voters differ in how they judge these perceived economic conditions.

Mecro-economic voting theory predicts that differences in the economic information that is relevant and available will lead to heterogeneity in individuals' perceptions of the aggregate economy. Therefore, rather than ask for an evaluation of the unemployment situation, we directly elicit information about unemployment.[6] This is related to the substantial literature examining heterogeneity in economic evaluations, although we focus on perceptions rather

[4]Van der Brug, van der Eijk and Franklin (2007, pp. 195–196) build on this critique and conclude, "Studies estimating the effects of subjective evaluations cannot be taken seriously as proper estimates of the effects of economic conditions."

[5]The results in Hetherington (1996) suggest this may have occurred in the 1992 presidential election.

[6]Ansolabehere, Meredith and Snowberg (2013) details the construction of questions that ask about numeric quantities, like the unemployment rate, and how these questions can be used to ascertain whether partisanship affects economic perceptions, judgments, or reporting.

than evaluations.[7]

Our work also relates to a small literature that examines how different groups respond to economic information across time. Hopkins (2012) shows that stock-market returns affect the economic expectations of high income earners more than low income earners. Similarly, Krause (1997) finds that economic news only affects the economic expectations of those with a college education. In contrast, Haller and Norpoth (1997) finds no difference in economic information between those who do and do not consume news. None of this work links differences in groups' economic information to support for the incumbent.

Local Economic Conditions. A small literature examines the relationship between local economic conditions and aggregate economic evaluations (Weatherford, 1983*b*; Books and Prysby, 1999; Reeves and Gimpel, 2011). These studies generally find that evaluations of the aggregate economy are more favorable in areas where local economic conditions are better. However, such cross-sectional studies may suffer from omitted variable bias.

A more sizable literature examines how local economic conditions relate to presidential vote shares. Like the studies mentioned above, these too may suffer from omitted variable bias. Indeed, this may be why such studies produce inconsistent results across elections. For example Brunk and Gough (1983) find that Cater did better in states with *higher* unemployment, whereas Abrams and Butkiewicz (1995) conclude that Bush performed better in 1992 in states with *lower* unemployment.[8]

Three studies use panel data to investigate the influence of local economic conditions on presidential vote shares across a broader set of elections. Both Strumpf and Phillippe

[7]See Kiewiet (1983); Weatherford (1983*a*,*b*); Conover, Feldman and Knight (1986); Kinder, Adams and Gronke (1989); Mutz (1992, 1993, 1994); Hetherington (1996); Holbrook and Garand (1996); Wlezien, Franklin and Twiggs (1997); Anderson, Duch and Palmer (2000); Palmer and Duch (2001); Duch and Palmer (2002); Anderson, Mendes and Tverdova (2004); Evans and Andersen (2006); Duch and Stevenson (2008); Evans and Pickup (2010); Reeves and Gimpel (2011) for some notable examples. These studies find observables such as gender, race, partisanship, and education are often significantly correlated with economic evaluations in a cross-section.

[8]Wright (1974); Abrams (1980); Achen and Bartels (2005) also examine how local economic conditions relate to changes in vote share. A related literature looks at the effect state economic performance on gubernatorial popularity and votes (for example: Hansen, 1999; Wolfers, 2002; Cohen and King, 2004).

(1999) and Eisenberg and Ketcham (2004) find effects of local per-capita income growth on presidential vote shares that are an order of magnitude smaller than national changes. Neither finds an effect of local unemployment. A third study uses county-level unemployment as an instrument for economic evaluations (Hansford and Gomez, 2011). The interpretation of the results in these studies are emblematic of the tension in the economic voting literature described in the first paragraph: the first two studies above interpret their findings as evidence of self-interested behavior, whereas the third interprets its findings as (somewhat) supportive of the sociotropic voting hypothesis.

We build on this literature in a number of ways. By constructing a panel of retrospective economic evaluations, we can control for unobserved, persistent, heterogeneity in economic evaluations across different locations. This reduces concerns about omitted variable bias. Moreover, we use a monthly, 36-year-long panel of presidential approval by state that gives us substantially greater statistical power than previous work. This allows us to uncover an effect of local unemployment, in contrast to the findings of Strumpf and Phillippe (1999) and Eisenberg and Ketcham (2004). Moreover, our estimate of the relative importance of local unemployment is twice as large as the estimated effect of local income growth in these two studies.

2 Theory

Our theory starts from the observation that the economy is not monolithic: there are different sectors of the economy, and different professions within a given sector that may have different fortunes over the same time period. These trends are somewhere between the micro- and the macro-economy, a space economists sometimes refer to as the mecro-economy.

We then adopt a particularly simple formulation for political information and behavior. Specifically, as a by-product of economic planning, individuals also obtain information on the effect of the incumbents' policies (Popkin, 1991). This information causes them to update

their beliefs both about whether the incumbent's policies are good or bad for both themselves and for the aggregate economy. Irrespective of whether a voter has self-interested or other-regarding preferences, they compare their ex-post belief to a common baseline, and vote for the incumbent if their ex-post belief is greater than the baseline. Otherwise they vote for the opposition.

Individuals invest in economic information to the extent it increases their own utility. In the case of unemployment, individuals gather information about others' employment status to gain information about their own future income.[9] An individual prefers signals of current employment conditions that are more directly related to his own *personal unemployment rate*—that is, the probability he will become unemployed. However, there is a tradeoff between sampling variance and sampling bias. At one extreme is an individual's own unemployment status, which measures an individual's exact quantity of interest—their own probability of being unemployed under the incumbent—but with a small sample size that results in a large amount of sampling variance. At the other extreme is the national unemployment rate, which has almost no sampling variance, but pools an individual's personal unemployment rate with the rates of everyone else.

An individual prefers information from their mecro-economy. This information has lower sampling variance than personal information, and lower sampling bias than national information. Moreover, information about an individual's mecro-economy is essentially free. Local information arrises as a by-product of an individual's everyday interactions in his or her home, neighborhood, and workplace.

[9]We focus throughout on unemployment because it is important for economic voting, is directly experienced by individuals, and varies markedly, and measurably, between groups. In high quality datasets, unemployment is the strongest predictor of election outcomes in the U.S. (Kiewiet and Udell, 1998). Further, employment and unemployment are directly experienced by individuals, their friends, and their neighbors. Indeed, it is likely easier to observe whether or not your neighbor is employed, which is informative of unemployment, than it is to gauge the size of a raise he or she may or may not have received, which is informative of economic growth. Finally, unlike economic growth, unemployment is often tabulated by demographic group, allowing us to directly test whether groups that experience higher rates of unemployment have systematically different economic perceptions and political preferences. As noted in the Appendix, it is straight-forward to extend the theory to cover more continuous indicators such as personal income and economic growth.

Together, the above implies that individuals will have different information, and hence perceptions, about the state of the economy that will, on average, reflect the situation in an individual's mecro-economies. For example, if members of an individual's family, neighborhood, profession, and other social circles all have jobs, he will conclude that his personal unemployment rate is low under the incumbent. In contrast, if many members of an individual's family, neighborhood, profession and other social circles are jobless, he will conclude that his personal unemployment rate is high under the incumbent.

Of course, an individual may (or may not) obtain additional information about the aggregate economy. For example, the national unemployment rate is often reported on the news. Perceptions of the aggregate economy will follow this additional information. However, individuals that obtain no additional information make inferences about the state of national economy based on available information. Because mecro- and aggregate economic performance are highly correlated, such individuals' perceptions of the national economy will reflect information about their mecro-economies.[10] Indeed, we use variation in exposure to media as a further test of mecro-economic voting theory, in Section 3.2, by examining whether there are systematic differences in aggregate economic perceptions between those that do and do not watch the national news.[11]

The fact that merco-economic performance shapes perceptions of aggregate economic performance makes it difficult to distinguish between economic voters whose motivations are self-interested or other-regarding. Because mecro-economic conditions are a less noisy signal of which candidate or party is better for one's own economic well-being than personal economic conditions, a self-interested voter will cast their vote on the basis of mecro-economic conditions. If perceptions of the national economy largely reflect the conditions in a respondent's mecro-economy, self-interested voting causes vote choices to associate with assessments

[10]This is similar to the anchoring or availability bias documented in Kahneman and Tversky (1974) but is also consistent with the bayesian model used in the appendix.

[11]The idea that individuals have different costs of learning information is reflected in many public opinion studies, for example: Alvarez and Franklin (1994); Alvarez (1997); Bartels (1986); Luskin (1987); Zaller (1992); and Zaller and Feldman (1992). Moreover, about half of the U.S. public admits to not getting any economic news (Haller and Norpoth, 1997).

of national economic conditions.

Biased perceptions of the aggregate economic performance also affect the ability of other-regarding voters to support the candidate who is best for the aggregate economy. An other-regarding voter will cast their vote on the basis of their own mecro-economic information as this is their best signal of national economic performance.

In summary, this section makes two points. First, mecro-economic voting theory predicts that perceptions of the aggregate economy will be closely related to an individual's personal economic situation, and that vote choice will depend on that perception. And second, this pattern of perceptions implies that patterns of economic voting will be the same whether individuals' preferences are based in self-interest, or are other-regarding.

3 Cross-sectional Evidence

The results in this section are concerned with individuals' perceptions of the national unemployment rate. As noted above, we expect these perceptions to closely track conditions in an individual's mecro-economies. We show this two ways: by evaluating perceptions group by group, and then summarizing unemployment statistics based on a respondent's observable observable characteristics and comparing this to a respondent's reported unemployment perceptions.

3.1 Unemployment Perceptions

The results discussed in this section concern the following question asked of 3000 respondents to the 2008 Cooperative Congressional Election Survey (CCES):

> The unemployment rate in the U.S. has varied between 2.5% and 10.8% between 1948 and today. The average unemployment rate during that time was 5.8%.
>
> As far as you know, what is the current rate of unemployment? That is, of the adults in the US who wanted to work during the second week of October, what

percent of them would you guess were unemployed and looking for a job?

Figure 1 displays the general pattern in the data: groups that experience more unemployment report, on average, higher unemployment rates. This is true whether the average is measured according to the median or mean.[12] However, one might worry that these assessments are driven by other factors. For example, perhaps younger people are more liberal, and the more liberal a person is, the higher he or she perceives unemployment to be. While it is unlikely that we could establish a causal relationship between a person's mecro-economic environment and his or her assessments of unemployment rates, we can certainly control for observable correlates in more complete regression analyses.

Table 1 and Table 2 present these analyses.[13] Columns 1 and 2 present OLS and LAD regressions, respectively, of a respondent's reported unemployment rate on various demographic characteristics.[14]

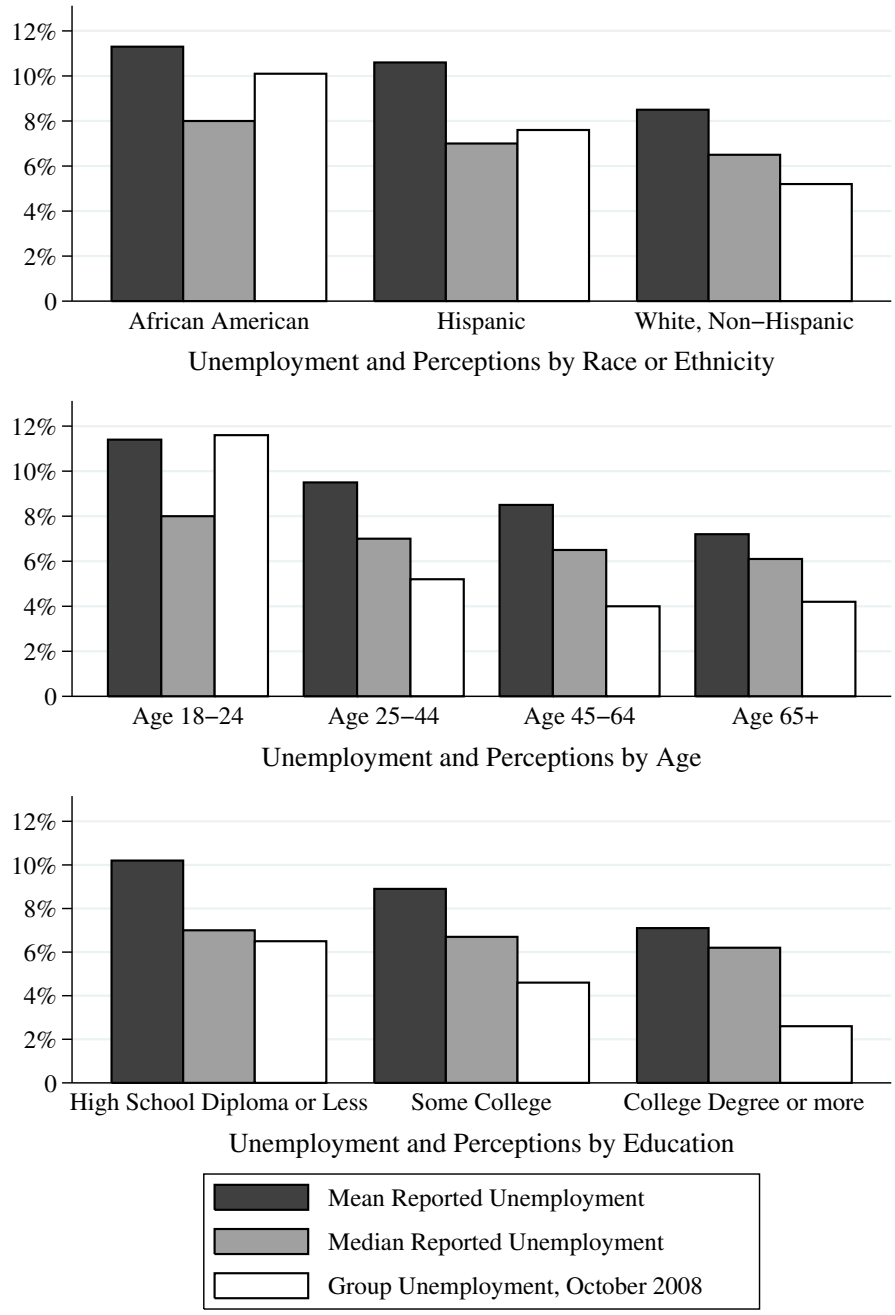
The coefficients in Columns 1 and 2 of Table 1 generally agree with the patterns in Figure 1: groups that experience more unemployment report, on average, higher unemployment rates. This can be seen by comparing the coefficients Columns 1 and 2 with the unemployment rate by group—derived from the Current Population Study (CPS) of the Bureau of Labor Statistics (BLS) for October, 2008—in Column 3.

[12] In order to prevent unusually high responses from driving differences in the mean, we top code responses at 25% throughout. This affects 6.3% of respondents. Top coding at 15% through 50% (or just dropping observations over that level) produces qualitatively similar results. In general, the greater the value at which top coding begins, the more pronounced the differences between groups.

[13] Unfortunately, we could not control for employment sector, as the CCES does not contain such data.

[14] A least absolute difference (LAD) specification—often referred to as a median regression—gives coefficients that can be seen as the difference between the median reported unemployment rate for respondents with that attribute and a baseline, controlling for observable characteristics. By comparison, in OLS, the coefficient on an attribute can be seen as the difference between the mean reported unemployment rate for respondents with that attribute and a baseline, controlling for observable characteristics. Consistent with Figure 1, the OLS coefficients (differences between means, by group) are greater than the LAD coefficients (differences between medians, by group).

Figure 1: Reported unemployment rates increase as the true unemployment rate of a group increases.



Notes: Reported unemployment is top-coded at 25% in order to reduce the influence of outliers in the means.

Table 1: Correlates of Unemployment Status and Reported Unemployment Rate in October, 2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Assessment of		Labor Market Outcomes (CPS October, 2008)			
Dependent Variable:	Unemployment Rate		Unemployed: 0 = Employed, 1 = Unemployed			
			Employed: 0 = Not Employed, 1 = Employed			
			% of Subgroup		Probit Marginal Effects	
	LAD	OLS	Unemployed	Employed	Unemployed	Employed
Excluded Group (Constant)	6.81***	10.28***	23.04	41.87	19.75***	43.89***
	(0.71)	(1.23)	(3.07)	(2.69)	(1.34)	(1.71)
Age 18-24			Excluded Group			
Age 25-34	0.39	0.06	-5.80	18.58	-3.27***	14.99***
	(0.50)	(0.66)	(0.49)	(0.64)	(0.39)	(0.88)
Age 35-44	-0.65	-1.82***	-7.05	20.85	-3.85***	16.75***
	(0.47)	(0.62)	(0.47)	(0.62)	(0.40)	(0.98)
Age 45-54	-0.70	-1.76***	-7.95	19.30	-4.61***	15.07***
	(0.45)	(0.57)	(0.46)	(0.62)	(0.52)	(0.99)
Age 55-64	-0.77*	-2.34***	-7.83	3.12	-4.13***	-2.67**
	(0.43)	(0.52)	(0.48)	(0.68)	(0.52)	(1.29)
Age 65-74	-0.82*	-2.59***	-8.08	-35.16	-4.57***	-40.94***
	(0.43)	(0.53)	(0.62)	(0.72)	(0.62)	(1.09)
Age 75+	-1.10***	-3.37***	-7.42	-52.24	-4.18***	-57.30***
	(0.40)	(0.48)	(1.05)	(0.61)	(0.95)	(1.02)
Unmarried Male			Excluded Group			
Married Male	0.03	-0.14	-6.33	9.73	-4.07***	14.05***
	(0.06)	(0.16)	(0.33)	(0.49)	(0.30)	(0.57)

Unmarried Female	0.82***	2.46***	-5.81	-5.54	-2.10***	-2.15***
	(0.12)	(0.36)	(0.35)	(0.51)	(0.43)	(0.64)
Married Female	0.57***	1.66***	-2.95	-8.72	-3.27***	-9.20***
	(0.12)	(0.20)	(0.39)	(0.54)	(0.28)	(1.03)
Not Black			Excluded Group			
Black	0.69***	2.11***	5.28	-5.22	3.99***	-7.41***
	(0.21)	(0.32)	(0.45)	(0.58)	(0.43)	(0.86)
Not Hispanic			Excluded Group			
Hispanic	0.03	0.99***	2.58	1.78	0.66**	0.82
	(0.10)	(0.34)	(0.35)	(0.52)	(0.33)	(0.92)
No High School Degree			Excluded Group			
Only High School Degree	-0.22	-1.22	-4.52	16.73	-3.60***	16.33***
	(0.39)	(0.77)	(0.52)	(0.59)	(0.39)	(0.93)
Some College	-0.50	-2.62***	-6.14	24.31	-5.12***	21.62***
	(0.40)	(0.79)	(0.51)	(0.59)	(0.40)	(0.94)
College Degree	-0.62	-3.23***	-8.46	33.17	-6.38***	30.03***
	(0.40)	(0.84)	(0.50)	(0.58)	(0.43)	(0.84)
State Unemployment Rate	0.08***	0.12*			0.88***	-1.62***
	(0.03)	(0.06)			(0.06)	(0.24)
N	2,969	2,969	67,720	100,173	67,720	100,173

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level with robust standard errors clustered at the state-level in the Probit and OLS regressions, and block-bootstrapped by state in the LAD regression. Regressions for unemployed only include those CPS respondents classified by the BLS as in the labor force. In all regressions observations are weighted by their sampling weight.

There are two notable deviations: even though both women and married men had lower unemployment rates than unmarried men, they perceive higher unemployment rates. Women may report higher unemployment rates because they participate in the labor force at a lower rate, resulting in a lower *employment rate*—the percent of a group that is actively employed. To the extent that the unemployment rate does not accurately reflect discouraged workers, it may be that women perceive a higher unemployment rate because their peer group includes many discouraged workers. While the Bureau of Labor Statistics (BLS) would view these women as being labor force non-participants, respondents may classify them as unemployed. Indeed, Column 4 shows that the patterns in Column 1 and 2 also track the employment rate for most groups.

However, differences in the employment rate cannot explain differences in unemployment perceptions between married and unmarried men. Why then do married men report higher unemployment rates than unmarried men? A potential answer comes from the literature on international political economy (IPE). IPE studies show that married men are more likely to favor protectionist trade policies, and scholars attribute this to married men having more economic anxiety.[15] While anxiety about the economy may lead married men to exaggerate the unemployment rate, as well as the threat of free trade, it seems more appropriate here to simply note that married men report unemployment rates inconsistent with theory.

To simplify the comparison of reported unemployment rates with personal unemployment and employment rates, we use the same CPS data to create a proxy for a respondent's personal unemployment and employment rate. This proxy is created using a probit regression—in Columns 5 and 6—of actual unemployment and employment status in October, 2008 on the same demographics as in the previous columns. This regression is then projected back to the individual respondent: that is, we proxy for the respondent's personal unemployment rate by the expected unemployment rate for someone with those observed characteristics.[16]

[15]See, for example, Hiscox (2006). We thank Stephanie Rickard for pointing this out.

[16]This is a proxy because there are many other unobservable factors which may be correlated with a respondent's true personal unemployment rate. Still, by construction, this proxy should have white noise errors, meaning that coefficients in Table 2 may be biased towards zero.

Table 2: Personal Unemployment Rates Associate with Assessments of the National Unemployment Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Assessment of National Unemployment Rate (CCES 2008)					
Ages Included:	All		18–64		All	
Regression Type:	LAD	OLS	LAD	OLS	LAD	OLS
Personal	0.16***	0.38***	0.14***	0.26***	0.27***	0.41***
Unemployment Rate	(0.020)	(0.048)	(0.027)	(0.063)	(0.036)	(0.069)
Personal	0.004***	0.009**	-0.014***	-0.057***		
Employment Rate	(0.001)	(0.004)	(0.004)	(0.015)		
Watches					0.32***	-0.98**
National News					(0.120)	(0.419)
Unemployment Rate X					-0.18***	-0.11
National News					(0.036)	(0.071)
Constant	5.6***	5.7***	7.1***	11.5***	5.6***	7.2***
	(0.089)	(0.38)	(0.38)	(1.44)	(0.12)	(0.37)
N	2,969		2,371		2,969	

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level with robust standard errors clustered at the state-level in the OLS regressions, and block-bootstrapped, using 1,000 samples, by state in the LAD regression. Regressions for unemployed only include those CPS respondents classified by the BLS as participating in the labor force.

The estimated personal unemployment rates are very heterogeneous: from 0.9% for a married, 45-year-old white male with a Bachelor's degree in Utah, to 27.0% for a single, 19-year-old white male with less than a high school education in Michigan. Similarly, personal employment rates exhibit even more variation: from 1.3% for a widowed, 80-year-old white woman with less than a high school education in Michigan, to 95.6% for a 37-year-old white male with a Bachelor's degree in Utah.

Table 2 examines the association between respondent's reports of the national unemployment rate (on the CCES) with their estimated personal unemployment and employment rates. There is a robust relationship between personal unemployment rates and a respondent's reported national unemployment rate. Columns 1 and 2 show that the median and mean assessment of the unemployment rate increases by 0.16 and 0.38 for each percentage-

point increase in a respondent's personal unemployment rate, respectively. This shows directly that those who are more likely to be unemployed have a higher assessment of the national unemployment rate.

The relationship between personal employment rates and reported unemployment rates is less clear. The first two columns show, counter to expectations, that an increase in a respondent's employment rate increases their reported unemployment rate. However, the next two columns show that this is driven by respondents over 65. If we restrict the sample to those that are less than 65, and thus more likely to be in the labor force, the relationship is of the expected sign. This suggests that for those who are in the labor force, and thus, most likely to get their information from others in the labor force, there is some accounting for discouraged workers in reported unemployment rates.

This leads to obvious questions about what else can be said about sources of information about unemployment, especially the role of the media. The final two columns of Table 2 begin an investigation of the role of the media, continued in the next subsection.

3.2 Media Use and Perceptions

Mecro-economic voting specifies that differences in national economic perceptions are based on differences in information. This will be affected by differences in media use, which provides additional information such as the national unemployment rate. We leverage this fact to conduct two further tests that examine how access to information affects respondents' economic perceptions.

The last two columns of Table 2 suggest that national news is an important source of information. The negative interaction between personal unemployment rates and watching national news shows that assessments of the unemployment rate are less sensitive to respondents' own economic situations for those that watch national news. This is consistent with our expectation of decreased homogeneity in voters' perceptions of national economic conditions when information about the aggregate economy is available.

As national television news often reports the national unemployment rate, we expect to observe less heterogeneity in national unemployment assessments among those who report watching national television news. However, as gas prices are directly observable, we expect that heterogeneity in assessments of gas prices should be largely the same between those that do, and do not, watch national television news.

Table 3 tests these predictions, and confirms that the predicted patters exist in the data. In particular, among those that do not watch national news, different age, educational, income, and ethnic groups show greater differences in unemployment assessments than among those that do watch national news. Such differences do not exist in perceptions of gas prices. As these patterns may be difficult to observe in the individual coefficients, we provide an F-test of the proposition that the coefficients from the two types of respondents are different. For the first two columns—where reported unemployment is the dependent variable—the coefficients are statistically different, and for the second pair of columns—where reported gas price is the dependent variable—they are not. As those who do and do not watch media are different in many ways, we cannot claim that this is a causal effect, however, it is still supportive of mecro-economic voting theory.

Although assessments of gas prices do not change with media exposure, our mecro-economic theory predicts that they should change with activities that provide more exposure to gas prices. Ansolabehere, Meredith and Snowberg (2013) show that, controlling for a host of demographic factors, each extra day per week a respondent drove made his or her reported perceptions 0.8 cents more accurate. Similarly, each extra day per week a respondent reported noticing gas prices induced an independent 1.6 cent increase in accuracy. To put this another way, controlling for other factors, a respondent who drove to work and noticed gas prices five days a week would be 12 cents more accurate than the average respondent. Given that the mean difference between reported and actual gas prices was about 20 cents, this implies that people who drive and notice gas prices on their way to work are 60% more

Table 3: Correlates of Unemployment and Gas Price Assessments by Media Environment

	(1)	(2)	(3)	(4)
Dependent Variable:	Assessment of National Unemployment Rate (CCES 2008)		Assessment of State Gas Price (in ¢) (CCES 2008)	
Sample: Watch National News?	Yes	No	Yes	No
Age 25-34	0.49	0.41	0.66	-5.19
	(0.36)	(0.83)	(6.16)	(7.19)
Age 35-44	-0.22	-0.77	5.11	2.84
	(0.32)	(0.75)	(5.73)	(6.28)
Age 45-54	-0.25	-0.81	6.10	-0.54
	(0.32)	(0.69)	(5.37)	(6.14)
Age 55-64	-0.35	-0.94	5.61	0.72
	(0.31)	(0.68)	(5.69)	(6.45)
Age 65-74	-0.37	-1.14	5.24	3.12
	(0.31)	(0.74)	(5.71)	(7.06)
Age 75+	-0.52*	-1.48*	11.44*	5.30
	(0.29)	(0.81)	(6.44)	(13.69)
Married Male	0.00	-0.04	-5.44**	-10.23***
	(0.07)	(0.16)	(2.77)	(3.63)
Unmarried Female	0.71***	0.91***	5.02	-1.89
	(0.13)	(0.35)	(3.79)	(4.33)
Married Female	0.45***	0.66***	-3.30	-6.81**
	(0.17)	(0.25)	(3.02)	(3.42)
Black	0.48**	1.24*	5.25	5.54
	(0.19)	(0.66)	(4.34)	(4.24)
Hispanic	-0.06	0.25	8.82**	2.42
	(0.09)	(0.42)	(3.82)	(5.02)
Only High School Degree	0.23	-2.87	-4.03	-14.62*
	(0.28)	(2.96)	(6.85)	(7.96)
Some College	0.08	-3.45	3.63	-4.51
	(0.28)	(2.96)	(7.50)	(8.69)
College Degree	0.03	-3.76	8.46	-7.12
	(0.27)	(2.98)	(7.61)	(7.45)
State Unemployment Rate	0.09***	0.10		
	(0.03)	(0.07)		
Avg. Gas Price in State			1.46***	1.48***
			(0.16)	(0.19)
Constant	5.8***	10.0***	-135***	-119**
	(0.5)	(3.2)	(44)	(54)
H_o: Coefficients are Equal	F(16,2937)=2.138 p-value=0.005		F(16,2930)=0.913 p-value=0.553	
N	1,979	990	1,976	986

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level. LAD specifications with block-bootstrapped standard errors, using 1,000 samples, blocked at state level, in parenthesis.

Table 4: Vote Choice Associates with Unemployment Assessments.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: Vote for Obama = 1, Vote for McCain = 0 (CCES, N=2,026)						
Reported Unemployment	0.018***	0.007*	0.006			
	(0.003)	(0.004)	(0.004)			
Reported Unemployment X Within Historical Range				0.062***	0.023*	0.024*
				(0.010)	(0.013)	(0.013)
Below Historical Minimum				0.260	0.410*	0.455***
				(0.192)	(0.213)	(0.174)
Above Historical Maximum				0.537***	0.230**	0.236**
				(0.052)	(0.098)	(0.106)
Party Identification (7 dummy variables)	No	Yes	Yes	No	Yes	Yes
All Other Controls (From Table 1)	No	No	Yes	No	No	Yes

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level with robust standard errors in parenthesis. Coefficients are marginal effects estimated via probit with all other variables held constant at their sample means.

accurate in their assessments of the price of gas.[17]

3.3 Unemployment Perceptions and Vote Choice

We expect, based on the theory in Section 2, that the higher a respondent's reported unemployment level, the more likely he or she will be to vote for the candidate from the opposition party, which was the Democrats in 2008.

We regress an indicator variable coded one if the respondent indicated he or she voted for Barak Obama, the Democratic candidate, and zero if he or she voted for John McCain, the Republican candidate, on reported unemployment and a host of controls in Table 4.[18] Mecro-economic voting predicts that the coefficient on reported unemployment will be positive.

[17]Consistent with attributional theories discussed in the introduction, everyday interactions may also affect preferences: Egan and Mullin (2012) find that local weather conditions affect individuals' feelings about the importance of policies aimed at curbing global warming. However, as mentioned in the introduction, attributional theories largely ignore the role of information, and how this information affects perception.

[18]Sample sizes are smaller as those who reported not voting were not included in the analysis.

The first column of Table 4 shows that reported unemployment is significantly correlated with vote choice. However, as shown in Table 1, unemployment assessments are correlated with partisan leanings. In order to control for this, we enter dummy variables for each point of a seven-point party identification scale in the second column. Reported unemployment is still significantly related to vote choice, but the coefficient is smaller.

What other controls should be included in the regression? According to the theory above, demographic factors are proxies for different economic experiences and local conditions, that, in turn, cause individuals to have different perceptions. However, at the same time, demographic factors may have a direct effect on voting. Thus, although including demographic controls will absorb much of the effect predicted by theory, they are necessary to avoid omitted variable bias. The third column of Table 1 includes all our demographic controls in the regression, and the coefficient on reported unemployment shrinks, as expected.

It is likely that respondents who reported an unemployment rate below the historical minimum or above the historical maximum—given in the survey question—were not paying close attention to the survey. Therefore, columns four through six group together respondents who reported a level of unemployment above or below the range of historical values—that is below 2.5% or above 10.8%.[19] For those respondents who reported a level between 2.5% and 10.8%, reported unemployment enters the specification linearly, as in the first three columns.

We find a stronger association between reported unemployment and vote choice when we focus on only those responses within the range of historical values. In our preferred specification in Column 5 of Table 4, a percentage-point increase in unemployment rate assessment associates with a 2.3 percentage point increase in the probability of voting for Obama, which is significant at the $p < 0.1$ level. Thus, those respondents who believe that the unemployment rate is higher also were significantly more likely to vote against the incumbent party, as predicted.

[19]The reported unemployment rate of those above and below the frame is coded as zero in Table 4. We could also drop these respondents from the analysis—this produces similar results.

4 Evidence from Time-Series Data

Consistent with mecro-economic voting, the results in the previous section show that individuals with a higher personal unemployment rate report higher rates of national unemployment in 2008. However, other, unobserved, factors may be driving this relationship. For example, individuals who live in states with high unemployment in 2008 might be systematically different in some unmeasured way than individuals who live in states with low unemployment. To overcome this potential issue, we examine how changes in local conditions relate to changes in evaluations of the aggregate economy and the incumbent, controlling for both national trends and unobserved, persistent, characteristics.

To link our analysis in this section with the analysis in previous section, we examine how state unemployment rates associate with retrospective economic evaluations and presidential approval within a state. We focus on states for both theoretical and practical reasons. From a theoretical prospective, monthly state unemployment rates are reported by the Bureau of Labor Statistics, and widely disseminated by the media, making them an easily available piece of mecro-economic information. From a practical prospective, state is the only geographic variable consistently reported in all of the data sources we use. There are also disadvantages to focusing on states, as state unemployment may be less correlated with a voter's personal unemployment rate than more disaggregated information (see Reeves and Gimpel, 2011). This will create measurement error, making it more difficult for us to find an effect of state unemployment on economic evaluations and presidential support.

We first examine how state unemployment relates to the standard national retrospective economic evaluation[20] from the Michigan Survey of Consumer Attitudes and Behavior, which asks:

> Would you say that at the present time business conditions are better or worse than they were a year ago?

[20] In order to maintain consistency with Section 3 we would prefer to also be able to examine unemployment perceptions across time. However, data on unemployment perceptions is extremely limited.

This question is asked monthly by the Michigan Consumer Survey, but we only have access to data on state of residence from 1978–1997.[21]

Mecro-economic voting theory predicts that respondents in states with higher unemployment rates, or states where unemployment increased dramatically in the past 12 months, will report relatively worse national retrospective evaluations than respondents in states with low levels of unemployment. Table 5 shows this is the case. The first column indicates that the most important correlate of differences in national retrospective economic evaluations across time is the previous year's change in the national unemployment rate.[22] However, state unemployment rates, and the one year change in those rates, also significantly relate to differences in retrospective evaluations of business conditions. In the second column, we replace the national unemployment measures with time fixed effects. The results in this column are qualitatively similar.[23]

A concern with the results in Columns 1 and 2, as well as those in the previous section, is that some states may have chronically higher unemployment, and respondents in that state may generally be pessimistic about the economy for idiosyncratic reasons. To address this concern, we exploit the panel structure of our data and include state fixed effects in column three. Once again, both the level and change in the state unemployment rate are significantly correlated with national retrospective economic evaluations, however, the coefficient on state unemployment actually *increases*. The coefficients imply that independent variation in state unemployment rates has about 30% of the effect of similar variations in the national unemployment rate.

A contention of our theory is that people seek out information about mecro-economic conditions because it helps them learn about their personal unemployment rate. Thus, for it to be in an individual's interest to seek out information about the state economy, it

[21]Respondents' area codes are available in the micro data from these years archived in the Inter-University Consortium for Political and Social Research (ICPSR), which we map to state of residence.

[22]This replicates the findings of Clarke and Stewart (1994) and Haller and Norpoth (1994, 1997), among others, who show that *national* retrospective economic evaluations are strongly correlated with *national* economic conditions across time.

[23]Data from the American National Election Survey (ANES) produces similar results, see B.

Table 5: State unemployment is correlated with national retrospective economic evaluations, even when controlling for national trends, in data from the Michigan Consumer Survey (1978–1997).

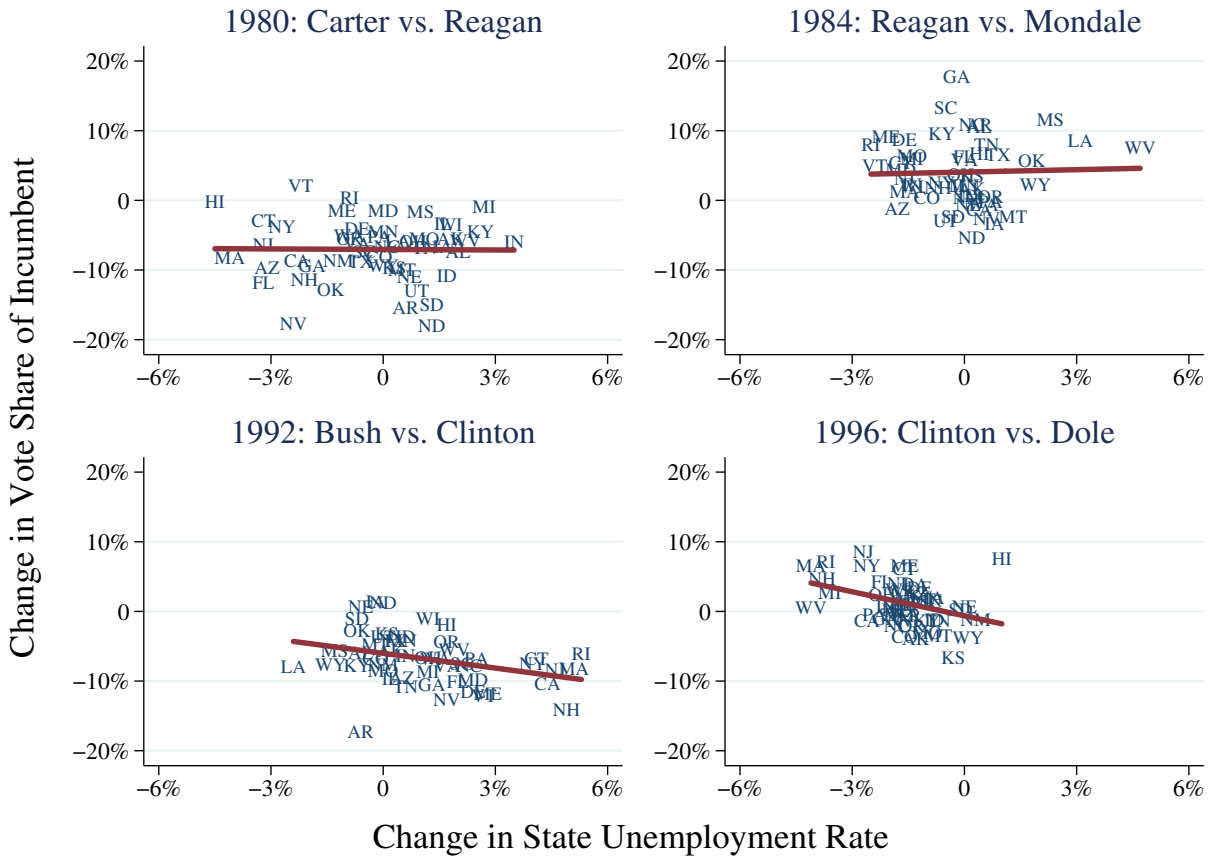
Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Retrospective Evaluation of Business Conditions			Retrospective Evaluation of Personal Finances		
	(1 = Worse, 2 = Same, 3 = Better)					
State Unemployment Rate	-0.019***	-0.021***	-0.039***	-0.019***	-0.021***	-0.036***
	(0.006)	(0.006)	(0.005)	(0.004)	(0.003)	(0.004)
Δ State Unemployment Rate	-0.073***	-0.063***	-0.053***	-0.009	-0.006	-0.001
	(0.017)	(0.011)	(0.011)	(0.010)	(0.006)	(0.005)
National Unemployment Rate	0.031*			0.008		
	(0.016)			(0.007)		
Δ National Unemployment Rate	-0.222***			-0.064***		
	(0.022)			(0.013)		
N	133,472			135,565		
Month X Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
State Fixed Effects	No	No	Yes	No	No	Yes

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level with standard errors clustered by both state (N = 48) and month X year (N = 240) in columns 1 and 4 and clustered by state in columns 2, 3, 5. and 6. Coefficients estimated using WLS with observations weighted by their sampling weight.

must be the case that state-level conditions help inform him or her about their own economic situation. To test whether this is the case, we repeat the specifications in Columns 1 through 3 for respondents' personal retrospective economic evaluations. Columns 4 through 6 show that state-level conditions do seem to inform respondents' assessments of their personal economic condition.

Having documented an independent effect of *state* economic conditions on *national* economic evaluations across time, we next examine the extent to which state unemployment affects political support. As discussed in Section 1.1, previous work focused on single elections finds inconsistent results about the effect of state-level economic conditions on state-level presidential vote shares. This is shown in Figure 2, which explores the relationship between

Figure 2: There is an inconsistent relationship between changes state unemployment and changes in incumbent vote share, election-by-election.



the change in state unemployment and the change in the incumbent's vote share in four presidential elections. While there is no relationship between these changes in 1980 and 1984, there is a strong negative relationship in 1992 and 1996.[24] This variability demonstrates that focusing on a single cross-section with only 50 observations reduces statistical power, and may lead to results driven by other, uncontrolled, factors.

We build on this literature by relating state unemployment rates to presidential approval from 1977–2012. To do so, we use data partially collected for this paper, and finalized in Gillon, Ladd and Meredith (2013), which codes every Gallup poll on the Roper Center web site that identifies the state of the respondent and asks about presidential approval. These

[24]There was also no relationship in 2004. We omit this graph due to space constraints.

polls, 986 in all, allow us to construct a monthly panel of presidential approval in each state. This gives us substantially greater statistical power to detect the effect of state employment conditions on presidential approval.

Table 6 shows that both national and state unemployment significantly affect presidential approval. The results in the first column imply that a one percentage point increase in the national unemployment rate is associated with a roughly two percentage point decrease in presidential approval. In comparison, the coefficient on the state unemployment rate implies that a one percentage point increase in the state unemployment rate reduces presidential approval by about 0.4 percentage points, although this coefficient is not statistically significant at conventional levels. However, once we control for national trends using monthly fixed effects, in Column 3, the standard error drops substantially so that effect of state unemployment is significant at the $p < 0.1$ level.

Column 5 of Table 6 shows that the relationship between state unemployment and presidential approval is fairly stable across different presidencies—with one exception. During the Carter presidency, higher state unemployment is related to more positive evaluations of the President. This may have occurred because inflation was the big economic issue in the late 1970s, and inflation is negatively related to unemployment. Whatever the reason, Column 4 omits the Carter years from the sample, and finds that the coefficient on state unemployment is roughly 20% of the magnitude of the coefficient on the national unemployment rate. This is quite similar to the ratio of the estimated coefficients for state and national unemployment on aggregate economic evaluations found in Table 5.

We believe that we are the first to document the independent effect of state unemployment across time on presidential approval. This contrasts with Strumpf and Phillippe (1999) and Eisenberg and Ketcham (2004), which find that state unemployment does not affect presidential vote share.

Table 6: State unemployment rates are correlated with presidential support.

Dependent Variable:	Presidential Approval (Gallup) (N = 1,073,110 from S = 968 Surveys) 0 = Does Not Approve 1/2 = Neither Approve nor Disapprove 1 = Approve				
Years of Analysis:	1977–2012	1977–2012	1977–2012	1981–2012	Varies
State Unemployment Rate	-0.36		-0.35*	-0.54***	
	(0.63)		(0.18)	(0.21)	
Δ State Unemployment Rate		0.04			
		(0.58)			
National Unemployment Rate	-2.06**				
	(0.82)				
Δ National Unemployment Rate		0.02			
		(0.78)			
State Unemployment Rate:					
Under Carter (N = 122,932; S = 79)					0.84
					(0.55)
Under Reagan (N = 184,847; S = 143)					-0.63
					(0.44)
Under Bush (I) (N = 125,777; S = 122)					-0.49*
					(0.25)
Under Clinton (N = 253,083; S = 254)					-0.33
					(0.52)
Under Bush (II) (N = 207,968; S = 200)					-0.75**
					(0.33)
Under Obama (N = 178,504; S = 188)					-0.20
					(0.31)
Month of Survey Fixed Effects	No	No	Yes	Yes	Yes

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level with robust standard errors clustered at the state level (51 clusters). Coefficients estimated using WLS with observations weighted by their sampling weight. Column 5 contains the results of 6 separate regressions, one for each Presidency.

5 Discussion: The Shifting Nature of Economic Voting

Consistent with our theory, we have shown that perceptions of macro-economic conditions associate with mecro-economic conditions. Specifically, data from the CCES shows that individuals who are members of groups that are more likely to be unemployed report higher national unemployment rates. Likewise, both aggregate and personal retrospective economic evaluations on the ANES are worse in states with higher unemployment. These differences in perceptions are politically important: vote choice significantly associates with reported unemployment, and presidential approval significantly associates with state unemployment.

These empirical findings suggest that theories of economic voting that do not explicitly account for the process by which voters acquire information about the aggregate economy are necessarily incomplete. They also highlight an opportunity for researcher about the micro foundations of economic voting. As voters are imperfectly informed about the aggregate economy, and political preferences depend on this information, voters' preferences may change as they become informed about the state of aggregate economic conditions. Thus, experiments that randomly provide voters with information about different aspects of the aggregate economy may provide tremendous insight into the types of information that affect voter behavior. This may, in-turn, help us better understand the micro foundations underlying the robust positive correlation between economic and incumbent performance.

We believe these results also have implications for election forecasting. As voters are influenced by their mecro-economies, vote patterns are affected by the structure of the economy. The U.S. economy has changed in many ways since the inaugural studies of economic voting in the early 1970s. In particular, industries such as steel and auto manufacturing have shrunk in both relative and absolute size, and services have become a much larger part of the economy. Thus, an election forecasting model based on the pattern of economic voting in the 1970s might be out of date by the mid-2000s. In general, forecasting models may incorrectly predict support for the incumbent party, and the size of the error will depend on both the size of the relative groups, which may shift across time, and the unemployment rate of those groups. This is consistent with the fact that vote share is sometimes several

standard deviations away from the predictions of economic voting models. For example, the original Fair (1978) economic voting model, which is based on macro-economic variables, was updated many times in order to produce more accurate estimates. Even so, in 2004, this model produced results that were off by as much as four standard deviations (Fair, 2006).[25]

This brings us back to the Kramer (1983) critique of using individual level data to understand economic voting, discussed in Section 1.1. Kramer maintained that variation in individual level responses to survey questions were largely noise, and thus, were either uninformative about, or produced biased understandings of, the mechanisms underlying economic voting. Our findings challenge this critique in two ways. First, we have shown that individuals' reports of economic perceptions seem to incorporate real information about their economic conditions. Second, economic perceptions are associated with differences in political support in both individual and aggregate data. This turns the Kramer critique on its head: ignoring individuals' economic perceptions and, instead, using only macro-economic data, runs the risk of creating a biased understanding of economic voting.

[25]Note that at least one standard deviation may be due to the Iraq War, see Karol and Miguel (2008).

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Appendix: Not Intended for Publication

This section formalizes the argument that self-interested voters will vote sociotropically. In particular, it shows that a self-interested voter will often ignore their own economic situation and vote on the basis of mecro-economic, or aggregate economic, conditions instead. We proceed in two steps. We first restate the basic assumptions of our theory from Section 2 and give an intuition for this result. Second, we present the formal analysis.

A A Prediction: Sociotropic Voting

Consider an individual who is planning for the next year, and will use information he gathers in the course of economic planning to inform his vote. Under standard assumptions, individuals will want to save against the possibility of becoming unemployed in the future. In order to appropriately save, individuals gather information to estimate their *personal unemployment rate*—the probability they will become unemployed the following year. As this personal unemployment rate is tied to the incumbent's economic policies, this information will also be useful in deciding for whom to vote.

In the tradition of citizen-candidate models (Osborne and Slivinski, 1996; Besley and Coate, 1997), the policies of both the incumbent and challenger are fixed and known. In accordance with the findings in Alvarez and Brehm (2002), the effects of those policies on an individual's personal unemployment rate are unknown. Thus, current economic information is useful to an individual trying to infer his personal unemployment rate under the incumbent. For concreteness, assume that an individual can have a personal unemployment rate that is either 10% (high) or 5% (low), which is the same as the rate in his mecro-economy. Suppose further that before a politician is elected, there is a 50% chance that her economic policies will cause the individual to have a low personal unemployment rate.

Consider two potential sources of information about an individual's personal unemployment rate: his current employment status, and the national unemployment rate. It is

straightforward to show that employment status is a very weak signal of the effect of the incumbent's economic policies: indeed, a voter who is employed will update to only a 51% probability that the incumbent's policies have resulted in a low personal unemployment rate.

This implies that the national unemployment rate needs a correlation of only 0.03 with an individual's personal unemployment rate to be more informative than the individual's own employment status. Thus, if a voter is aware of the national unemployment rate, or facts correlated with it such as unemployment reports from his mecro-economies, he will vote on the basis of that rate, even though he is self-interested.

A.1 Formalization

We consider a two period model where a continuum of individuals seek information in order to make optimal savings decisions. Each individual uses information revealed in this process about the effects of an incumbent politician's economic policies to inform his sincere vote. In the second period, each individual consumes his wages and savings: no choices are made. The fact that there is a continuum of individuals, and employment and unemployment are determined only by the policies of the incumbent politician in each period, means that we can focus on the decision problems of a single individual, taking the decision of all other individuals as given.

Consider an individual with a per period utility of consumption given by $u(\cdot)$, which is continuous, strictly increasing, and strictly concave. At the beginning of the first period the individual may be employed at a wage w, and is endowed with some amount $\varepsilon \geq w$, and. The individual saves an amount s from the first to the second period. His total expected utility if he is employed in the first period, as a function of the unemployment rate in the second period $R \in (0, 1)$ is given by

$$U(s|R) = u(\varepsilon + w - s) + Ru(s) + (1 - R)u(w + s)$$

Fact 1 *The optimal savings rate s^* is in the interval $\left(0, \frac{\varepsilon+w}{2}\right)$ if the individual is employed in the first period, and $\left(0, \frac{\varepsilon}{2}\right)$ if unemployed. s^* is increasing in R.*

We follow the citizen-candidate tradition in assuming that each politician's policies are known and fixed. However, we add a slight twist in that the effects of these policies on each individual's mecro-economy is unknown. Specifically, the individual's personal unemployment rate $R \in \{L, H\}$ is either low L, or high, H, with $L < H$ and $L + H < 1$.[26] Although the individual votes sincerely in the election, he knows he is not pivotal, and takes the probability that the incumbent will be reelected as some exogenous probability ξ.

The individual believes each politician's economic policies have a prior probability π of generating a high unemployment rate for him. He also witnesses two imperfect signals of his personal unemployment rate under the incumbent politician: his personal employment situation, $\sigma_E \in \{0, 1\}$—equal to zero if he is unemployed, and one if employed—and the aggregate unemployment rate $\sigma_{R^a} \in \{0, 1\}$, where one indicates a high unemployment rate, and zero a low unemployment rate. Signals are correlated with personal unemployment rates in the following way: $P(\sigma_{R^a} = 0 | R = L) = \gamma = P(\sigma_{R^a} = 1 | R = H)$, where $\gamma > \frac{1}{2}$.[27] The probability an individual is employed if his personal unemployment rate is high, $P(\sigma_E = 1 | R = H)$, is $1 - H$, and so on.

Defining $\pi(\sigma)$ as the posterior probability the individual's personal unemployment rate is high given signal σ, and redefining signal realizations so H is the realization that results in a higher posterior probability and L is the one resulting in a lower posterior, we have:

[26] As the main result, that more accurate signals are more valuable, follows directly from Persico (2000), it is possible to state much of the theory in far greater generality. For example, the theory with continuous signals of economic outcomes, such as income growth would look much the same. However, as the goal here is to present the logic, straightforward way, we have made every effort to keep the formalization here as simple as possible.

[27] This implies

$$Corr(R, \sigma_{R^a}) = (2\gamma - 1)\sqrt{\frac{\pi(1-\pi)}{\pi^i(1-\pi^i)}}$$

where $\pi^i = P(\sigma_{R^a} = 0) = \pi\gamma + (1-\pi)(1-\gamma)$.

Definition 1 *We say signal j is more* **accurate** *than signal k if:*

$$\pi(\sigma_j = H) \geq \pi(\sigma_k = H) \geq \pi(\sigma_k = L) \geq \pi(\sigma_j = L)$$

Thus, a binary signal is more accurate than another if either realization of the signal results in greater certainty of the underlying state. Note that this is not a strict ordering, as some signals may produce more certainty than another with a high realization, but less certainty with a low realization.

Proposition 1 *More accurate signals are more valuable.*

Note that this implies that mecro-economic information, being more correlated with an individual's personal unemployment rate—that is, a higher γ—this information will be more valuable than information about aggregate economic conditions.

Returning to the particulars of our model, we make a simple assumption on the parameters of the signaling structure:

Assumption 1 *We assume that*

$$\gamma > \frac{H}{L+H}. \tag{1}$$

Using personal unemployment rates of $H = 10\%$ and $L = 5\%$, this means that (1) holds when $\gamma > \frac{2}{3}$. That is to say, employment status is a less accurate signal than knowing 10% of the county is unemployed if, when 10% of the county is unemployed, there is greater than a two-thirds chance that you will also become unemployed with 10% probability. We believe this is reasonable and assume it throughout.

Fact 2 *When* (1) *holds, then σ_{R^a} is more accurate than σ_E.*

While the individual will observe σ_E, they will likely have to seek out σ_{R^a}. This last fact tells us that as long as the cost of seeking out σ_{R^a} is sufficiently low, the individual will do so.

The individual can thus use both his personal employment status σ_E and the aggregate unemployment rate σ_{R^a} to inform his (sincere) vote. If both the aggregate unemployment rate is low and the individual is employed, it is straightforward to show he will vote for the incumbent. This occurs because the individual's posterior belief that the incumbent's policies are good for him will be greater than π, the probability that a challenger's economic policies are good for him. Likewise, if the individual is both unemployed and aggregate unemployment rate is high, then the individual will vote for the challenger.

To determine how the individual will vote when they are employed, but the aggregate unemployment rate is high is more subtle. Specifically, it requires knowledge of the probability that both signals have a given realization when the incumbent's policies are either good or bad. While there are a variety of ways to structure these probabilities, we assume that the signals are conditionally independent, which can hold if the individual is a very small part of the aggregate economy. That is, $P(\sigma_E = e \cap \sigma_{R^a} = r|R) = P(\sigma_E = e|R) * P(\sigma_{R^a} = r|R)$.

Proposition 2 *If* $\gamma > \frac{1-L}{2-L-H}$*, then an individual's vote choice will be determined by the aggregate unemployment rate when he is employed, but his employment status when he is unemployed. If* $\gamma > \frac{H}{L+H}$*, as in* (1)*, then an individual's vote choice will always be determined by the aggregate unemployment rate.*

The proposition holds because being employed is an extremely weak signal that the incumbent's economic policies are good for the individual, and so it is easily outweighed by the better signal of the aggregate unemployment rate.

A.2 Proofs

Proof of Fact 1: Note that:

$$\frac{dU(s|R)}{ds} = -u'(\varepsilon + \mathbb{I}_E w - s) + Ru'(s) + (1-R)u'(w+s) \quad (2)$$

$$\frac{d^2U(s|R)}{ds^2} = u''(\varepsilon + \mathbb{I}_E w - s) + Ru''(s) + (1-R)u''(w+s) < 0 \quad (3)$$

where $\mathbb{I}_E$ is an indicator equal to one if the individual is employed in the first period. As (3) indicates that $U(s|R)$ is strictly concave, (2) will imply a unique equilibrium level of savings, s^*. Setting $s = 0$ and $s = \varepsilon + \mathbb{I}_E w$, respectively gives

$$\begin{aligned}
\left.\frac{dU(s|R)}{ds}\right|_{s=0} &= -u'(\varepsilon + \mathbb{I}_E w) + Ru'(0) + (1-R)u'(w) \\
&\geq -u'(w) + Ru'(0) + (1-R)u'(w) \\
&= -R(u'(w) - u'(0)) = -R\int_0^w u''(x)dx > 0 \\
\left.\frac{dU(s|R)}{ds}\right|_{s=\varepsilon+\mathbb{I}_E w} &= -u'(0) + Ru'(\varepsilon + \mathbb{I}_E w) + (1-R)u'(\varepsilon + \mathbb{I}_E w + w) \\
&< -u'(0) + u'(\varepsilon + \mathbb{I}_E w) = \int_0^{\varepsilon+\mathbb{I}_E w} u''(x)dx < 0
\end{aligned}$$

so s^* will be in the interior of $(0, w)$. The integral representation follows from the fundamental theorem of calculus. As (2) defines s^*, we can use implicit function theorem to (via implicit differentiation) to determine

$$\frac{ds^*}{dR} = -\frac{\frac{\partial}{\partial R}\left(\frac{dU(s|R)}{ds}\right)}{\frac{\partial}{\partial s^*}\left(\frac{dU(s|R)}{ds}\right)} = \frac{\int_s^{w+s} u''(x)dx}{u''(\varepsilon + \mathbb{I}_E w - s) + Ru''(s) + (1-R)u''(w+s)} > 0 \qquad (4)$$

Thus, s^* is increasing in R, it is maximized when $R = 1$. When $R = 1$, s^* solves $u'(\varepsilon + \mathbb{I}_E w - s) = u'(s)$, that is, $s^* = \frac{\varepsilon + \mathbb{I}_E w}{2}$. Thus, $s^* \in \left(0, \frac{\varepsilon+\mathbb{I}_E w}{2}\right)$. ■

Proof of Proposition 1: Because of the independence property of preferences underlying the utility representation, we can ignore the exogenous probability $1 - \xi$ that the incumbent will not be re-elected, as this will proportionally lower the value of all signals. Moreover, without loss of generality, we can consider the case where $\varepsilon = 0$, and the individual is employed in the first period (or $\varepsilon = w$, and the agent is unemployed). Noting that u is concave and thus satisfies single-crossing, the result follows immediately from Theorem 1 of

Persico (2000) or Lehmann (1988).[28]

■

Proof of Fact 2: Start by re-writing (1) as the first inequality below:

$$\frac{\gamma}{1-\gamma} > \frac{H}{L} > \frac{1-L}{1-H}. \tag{5}$$

The second inequality follows from the fact that $H > L$ and $L + H < 1$. We have that

$$\begin{aligned} \gamma(1-\pi)L &> H(1-\pi)(1-\gamma) \\ \pi\gamma(\pi H + (1-\pi)L) &> \pi H(\pi\gamma + (1-\pi)(1-\gamma)) \\ \pi(\sigma_{R^a}{=}1) = \frac{\pi\gamma}{\pi\gamma + (1-\pi)(1-\gamma)} &> \frac{\pi H}{\pi H + (1-\pi)L} = \pi(\sigma_E{=}1). \end{aligned}$$

Using the second inequality in (5) we have

$$\begin{aligned} \gamma(1-\pi)(1-H) &> (1-\gamma)(1-\pi)(1-L) \\ \pi(1-H)(\pi(1-\gamma) + (1-\pi)\gamma) &> \pi(1-\gamma)(\pi(1-H) + (1-\pi)(1-L)) \\ \pi(\sigma_E{=}0) = \frac{\pi(1-H)}{\pi(1-H) + (1-\pi)(1-L)} &> \frac{\pi(1-\gamma)}{\pi(1-\gamma) + (1-\pi)\gamma} = \pi(\sigma_{R^a}{=}0). \end{aligned}$$

Thus, $\pi(\sigma_{R^a}{=}1) > \pi(\sigma_E{=}1) > \pi(\sigma_E{=}0) > \pi(\sigma_{R^a}{=}0)$, so σ_{R^a} is more accurate than σ_E. ■

Proof of Proposition 2: If the individual is employed, but the unemployment rate is high in the individual's mecro-economy, then he will vote for the challenger when

$$\frac{\pi(1-\gamma)(1-L)}{(1-\pi)\gamma(1-H) + \pi(1-\gamma)(1-L)} < \pi \iff \gamma > \frac{1-L}{2-L-H}.$$

which is assumed to be true as in (5). If, instead, the individual is unemployed, but the

[28] A brute-force proof is available from the authors upon request.

unemployment rate is low, then the individual will vote for the incumbent when

$$\frac{\pi\gamma L}{\pi\gamma L + (1-\pi)(1-\gamma)H} > \pi \iff \gamma > \frac{H}{L+H},$$

which is satisfied whenever (1) is true.

The statement of the proposition holds when

$$\frac{H}{L+H} > \frac{1-L}{2-L-H}.$$

This is true as long as

$$\frac{H}{L} > \frac{1-L}{1-H},$$

which is shown to hold in (5).

■

B An Additional Specification

In the text we mention that the results in Table 5 are quite similar to those found using the retrospective questions from the ANES. We present those results here in Table B.1. The coefficients are similar both in terms of magnitude and statistical significance. We chose not to present these results in the text because they are largely redundant, and because the ANES, with only 14 time periods, has highly collinear state and national unemployment rates, preventing regressions that consider both state and national levels and trends simultaneously.

Table B.1: State unemployment is correlated with national retrospective economic evaluations, even when controlling for national trends in the ANES (1980–2008).

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Retrospective Evaluation of National Economy (1 = Worse, 2 = Same, 3 = Better)				Retrospective Evaluation of Personal Situation (1 = Worse, 2 = Same, 3 = Better)			
State Unemployment Rate	-0.014***		-0.010**	-0.024***	-0.007**		-0.006**	-0.007*
	(0.001)		(0.005)	(0.008)	(0.003)		(0.002)	(0.004)
Δ State Unemployment Rate		-0.029*	-0.029***	-0.023**		-0.006	-0.001	0.005
		(0.017)	(0.009)	(0.009)		(0.005)	(0.004)	(0.004)
National Unemployment Rate	-0.133***				-0.012			
	(0.049)				(0.016)			
Δ National Unemployment Rate		-0.285***				-0.021		
		(0.054)				(0.020)		
N	25,051				25,301			
Year Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
State Fixed Effects	No	No	No	Yes	No	No	No	Yes

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10% level with standard errors clustered by both state (N = 48) and year (N = 14) in Columns 1, 2, 5, and 6 and clustered by state in Columns 3, 4, 7, and 8 in parenthesis. Coefficients estimated using WLS with observations weighted by their sampling weight.